argues that selection hypotheses put forward to explain adaptive strategies must rest on a sound theoretical basis. He goes on to examine the theoretical justification for aspects of kin selection and male-female conflict. He concludes that there is no single universal answer as to whether calculations of collective or inclusive fitness give more useful descriptions of the selection of social acts in plant reproduction. Lloyd cautions that each phenomenon must be carefully examined, that kin selection formulations are not always accurate and that they have sometimes been invoked inappropriately in the past. "We cannot simply assume that kin selection is the preferred mode for describing the action of natural selection whenever we are dealing with social acts among relatives. In the future, kin selection formulations should be employed more advisedly, only when they give an accurate description of events." Holsinger explores the evolution of plant mating systems in the context of selfing in plant reproduction. He starts by making distinctions concerning inbreeding depression at the population level and at the sibling level. He then develops an alternative model, the mass-action effect model to investigate the origin and maintenance of selfing in populations. Using this model, Holsinger is able to show how plant mating systems may depend on the density of individuals and the frequency of mating types rather than on some intrinsic selective advantage. He describes his model as a hybrid between population genetic traditions that associate selfing with reproductive advantage with ecological studies that show environmental conditions may play an important role in determining when selfing evolves.

Among the other chapters, my favorite was one by Pamela K. Diggle on development and the evolution of plant reproductive characters. My interest in this chapter may result simply from how much I learned, but I think also because it is an introduction to an aspect of evolution that we all know is "important," but is not well-integrated into our thinking and experimental approaches, showing up only now and then. This chapter does an excellent job of bringing in developmental models like heterochrony, progenesis and neotony and clearly illustrating how in some circumstances they can influence floral morphology and reproductive syndromes.

All in all this is an excellent book that really does accomplish the objective of making the current research in reproductive biology accessible to a larger audience, and it does it in a generally exciting and interesting way. The book is well-edited and I found only one typo. Most chapters are well-illustrated although even more would have been helpful. Because it is a multi-author book, some chapters suffer from being combined with really well-written and clear chapters. I noticed that if I read the same chapter on different occasions, my opinion of it could increase considerably just due to the lack of contrast with the better-written chapters.

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Flora of North America, Volume 2, Pteridophytes and Gymnosperms. Edited by NANCY R. MORIN. Oxford University Press, New York. xvi + 475 p. Hardcover, $75. ISBN 0-19-508242-7.

Much has already been written concerning the landmark publication of the first two volumes of Flora North America (FNA). The monumental efforts of Dr. Nancy Morin, the editorial committee, and the contributing authors have deservedly met with near universal praise. Rather than repeat the accolades of other reviewers, I will discuss the taxonomic treatments of Volume 2 from my perspective as a systematist interested in plant evolutionary relationships and conservation biology.

One of the major goals of FNA is the synthesis and incorporation of the systematic research relevant to each taxon. Through the combined efforts of the authors and editors, the coverage of the taxonomic and floristic literature is superb. More remarkably, the majority of the accounts of the ferns have successfully assimilated results from cytogenetics and enzyme electrophoresis. The groundbreaking work on hybridization in *Asplenium* initiated by Herb and Florence Wagner in the 1950's served as the model for further biosystematic studies of ferns, much of it conducted in the last 20 years. The power of these studies, and the influence of the Wagners, is likely responsible for the inclusion of reticulograms in many of the fern treatments. These figures do an excellent job of summarizing our remarkably good knowledge of reticulate evolution in the ferns. Hypotheses of evolutionary relationships are best summarized in diagrams, and it is hoped that FNA will continue to incorporate reticulograms *and* cladograms (none are found in Volume 2) in future volumes.

It is encouraging to see that many of the fern treatments have been written by the same systematists who conducted the complementary experimental studies. This has resulted in treatments that include important biological insights into the distribution and evolutionary history of the taxa. In addition, the extensive field experience of these pteridologists results in comments like "this species is most often confused with . . ." which will greatly assist the users of FNA. However the field botanist may not appreciate all of the experimental results incorporated into Volume 2. For example, only isozyme analysis can discriminate the morphologically identical gametophytes of *Trichomanes intricatum* (its sporophytes are unknown) from those of other *Trichomanes* species! In practice these gametophytes would be more readily confused with algae or moss protonemata, the introduction to the genus gives helpful distinguishing features.

While the brief discussions following the taxonomic descriptions are full of valuable information not easily found elsewhere, I found myself frustrated by the general lack of discussion for the classifications used in the various treatments. The introduction to Volume 2 states that "with few exceptions taxa are presented in taxonomic sequence. If an author is unable to produce a classification, the taxa are arranged alphabetically, and the reasons are given in the discussion." In my opinion, it is the "taxonomic sequence" that requires explicit justification. On the other hand an alphabetical arrangement conveys to me the generally honest assessment that we "just don't know " enough about the relationships. And assuming an author does have a well-founded hypothesis of phylogenetic relationships for a genus—how is this to be converted to a linear sequence of taxa? Authors have interpreted the requirement to produce a "taxonomic sequence" in various ways. Many list the species of a genus in the order that they appear in the key, others list them alphabetically throughout or within (often undefined) subgroups, and a few appear to have arranged them according to an unspecified taxonomic scheme. The same inconsistency of approach exists for the higher taxonomic groups. At the generic level and above our understanding of phylogenetic relationships is currently being revolutionized by the study of nucleic acid sequences. Thus it is likely that much of the taxonomic sequence in Volume 2 will appear very dated by the time FNA is complete, whereas an alphabetical arrangement would remain valid for a significantly longer period of time.

A total of 66 North American pteridophytes have been either newly described or placed in new combinations since 1984. (Incidentally, this information was retrieved by accessing the FNA database at the Missouri Botanic Garden and searching for year of publication; this demonstrates the utility of an extremely important adjunct to FNA.) Much of this taxonomic work is supported by experimental studies, leading to a treatment that clearly distills the "state of the art" in pteridophyte systematics.

In contrast to the fervent taxonomic activity in ferns, only two new taxa have been published for the FNA gymnosperms in the last decade. While numerous studies relevant to our systematic understanding of the gymnosperms have been carried out during this period, and some of these are cited in FNA, the implications of these studies are generally not incorporated into the taxonomic accounts. Examples include

the genetic studies of the *Pinus ponderosa* and *Pinus contorta* species complexes. Perhaps this results from the fact that the studies are done by forest geneticists, and not the systematists contributing to FNA. This is unfortunate, for it means that FNA's goal of synthesizing the "wide-ranging botanical data" remains unfinished in the case of the gymnosperms.

In Volume 2, 45 taxa are flagged "of conservation concern" (thanks again to the FNA database for allowing easy compilation of this figure). Remarkably, over 50% of these taxa are confined to three genera, *Selaginella* (9), *Isoetes* (7), and *Botrychium* (10). Unfortunately, many of the FNA accounts contain little or no information as to why a particular taxon has been deemed of conservation concern. Why for example is *Selaginella oregana* of concern while *Botrychium ascendens* is not? The former is not considered on any state, federal, or Natural Heritage Program list, while the latter is a candidate for federal listing under the Endangered Species Act and is on state lists in California, Oregon, and Washington. For the term "of conservation concern" to be useful, a discussion of its application in a particular situation should always be given.

Persons interested in plant conservation will also look to the distribution maps provided for each and every taxon. All distributions are presented on a standard base map of North America. This is useful for visualizing diverse biogeographic patterns such as widespread taxa, local endemism, and disjunct distributions. However, from a conservation perspective, this "one size fits all" approach is less helpful. For example, the distribution of *Pinus torreyana* ssp. *insularis* can only be obtained from the text since the "spot" is larger than "specks" that represent Santa Rosa and neighboring islands. I realize that a continental flora cannot provide detailed information on the local distribution of each species in the same way that a national weather forecast won't tell me the probability or rain tomorrow in Corvallis. Since this is the case, references to where to find more detailed distribution maps would be a helpful addition. Also I could not find an explanation for the dark vs. light shading on the maps—apparently the former is used for scattered occurrences over the indicated range (cf. *Sequoiadendron giganteum* and *Cupressus* spp.) as opposed to a more continuous distribution. Finally, I must point out that *Botrychium pumicola,* the only Oregon endemic in Volume 2, is not restricted to Greenland as its unintentionally misplaced map would suggest. Fortunately its distribution is described in the text in more detail than most.

I must admit that I feel a bit ungrateful concentrating on the few shortcomings of Volume 2 and offering unsolicited advice to the FNA editorial committee. For this milestone volume is without a doubt of tremendous benefit to the study of North American botany and its positive contributions far outweigh the minor imperfections. No botanical library will be complete without the Flora of North America, and I eagerly await the appearance of future volumes.

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